



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,153	08/27/2001	Maneesh Bahadur	DC4945	7086

137 7590 04/22/2003

DOW CORNING CORPORATION CO1232  
2200 W. SALZBURG ROAD  
P.O. BOX 994  
MIDLAND, MI 48686-0994

EXAMINER

MCCLENDON, SANZA L

ART UNIT PAPER NUMBER

1711

DATE MAILED: 04/22/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/940,153	BAHADUR ET AL.
	Examiner	Art Unit
	Sanza L McClendon	1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.

- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.

- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) Responsive to communication(s) filed on 05 March 2003.

2a) This action is **FINAL**.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) 22-24 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-9, 13, 14, 19 and 20 is/are rejected.

7) Claim(s) 10-12, 15-18 and 21 is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ .
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6) <input type="checkbox"/> Other: _____ .

DETAILED ACTION

*Response to Amendment*

1. In response to the Amendment received on March 05, 2003, the examiner has carefully considered the amendments. The claim rejection under 35 U.S.C. § 112, 2nd paragraph for claims 1-13 and 17-20 has been overcome by the amendment and has hereby been withdrawn for consideration.

*Terminal Disclaimer*

2. The terminal disclaimer filed on March 05, 2003 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of US Patent number 6,069,185 has been reviewed and is accepted. The terminal disclaimer has been recorded.

*Response to Arguments*

3. Applicant's arguments, see paper number 5, filed March 05, 2003, with respect to claims 1-8, 13-14 and 19 have been fully considered and are persuasive. The rejection under the judicially created doctrine of obviousness-type double patenting of claims 1-8, 13-14, and 19 has been withdrawn.

4. Applicant's arguments, see paper number 5, with respect to claims 1-9, 13-14, and 19-20 have been fully considered and found not persuasive—see below. The rejection under the judicially created doctrine of obviousness-type double patenting of claims 1-9, 13-14, and 19-20 still stands. Applicant states that the claims in serial number 09/569,283 are directed to method. However, as the examiner of record of serial number 09/569,283 contends the claims of serial number 09/569,283 are directed to a composition—see the attachment.

*Double Patenting*

Art Unit: 1711

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1-9, 13-14, and 19-20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7, 11-12, 17-18, and 22 of copending Application No. 09/569,283. Although the conflicting claims are not identical, they are not patentably distinct from each other because serial number 09/569,283 claims a radiation curable composition comprising (A) an alkenyl ether functional polyisobutylene polymer which has at least 50 mole percent of a non-terminal repeating unit of the polymer are isobutylene units and contains at least one group having the formula found in claim 1 with corresponding definitions in dependent claims, (B) a cationic photoinitiator; and (C) a miscible reactive diluent selected from (i) difunctional vinyl ether reactive diluents and (ii) an acrylate reactive diluent. Wherein, said composition can further comprise free radical photoinitiators, such as those listed in claims 17-18, and 22. Said cationic photoinitiators can be selected from the listed in claims 6-7. Said free radical photoinitiators can be found in claim 22. Wherein there is substantial overlap of subject matter within claims 1-9, 13-14, and 19-20 of the instant application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

*Allowable Subject Matter*

7. Claims 10-12, 15-18 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a radiation curable composition, a method of making said radiation curable composition, and a method of making an article of manufacture; comprising (A) an alkenyl ether functional polyisobutylene polymer which has at least 50 mole percent of a non-terminal repeating unit of the polymer are isobutylene units and contains at least one group having the formula found in claim 1, (B) a cationic photoinitiator; and (C) a miscible reactive diluent selected from (i) difunctional vinyl ether reactive diluents; (ii) an acrylate reactive diluent; (iii) a mono-functional vinyl ether reactive diluent; and (iv) an epoxy functional diluent, wherein said composition further comprises an adhesion promoter.

*Conclusion*

1. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sanza L McClendon whose telephone

Art Unit: 1711

number is (703) 305-0505. The examiner can normally be reached on Monday through Friday 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (703) 308-2462. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0657.

Sanza L McClendon

Examiner

Art Unit 1711

SMc

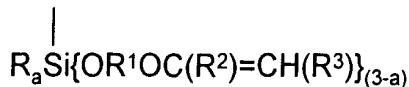
April 18, 2003

James J. Seidleck  
Supervisory Patent Examiner  
Technology Center 1700

**THAT WHICH IS CLAIMED IS:**

1. A radiation curable composition comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



wherein R is independently selected from the group consisting of monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from the group consisting of a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from

(i) a difunctional vinyl ether reactive diluent selected from the group consisting of butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2-20</sub> bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethoxyloxy butyl)-succinate, bis-(4-ethoxyloxy butyl)-adipate, bis-(4-ethoxyloxy butyl)-glutarate, bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) succinate, bis((4-((ethoxyloxy)methyl)cyclohexyl)methyl) adipate, and bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) glutarate or

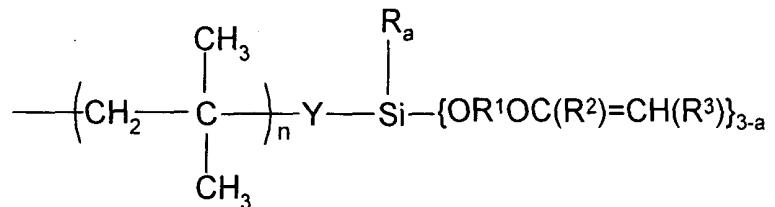
(ii) an acrylate reactive diluent with the formula



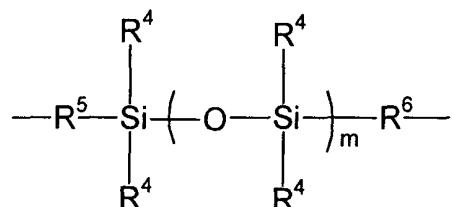
wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at-least one acrylate functional group, and b has a value of 2-4.

2. A composition according to Claim 1, wherein R is independently selected from the group consisting of methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, and a has a value of zero.

3. A composition according to Claim 1, wherein (A) is a polymer containing at least one group having the formula



wherein at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units, R is independently selected from the group consisting of monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from group consisting of a hydrogen atom and a monovalent hydrocarbon group, n has a value from 5 to 10,000, a has a value of 0 to 2, and Y is selected from the group consisting of (i) an alkylene group having from 2 to 10 carbon atoms and (ii) a group having the formula



where R<sup>4</sup> is a monovalent hydrocarbon group, R<sup>5</sup> and R<sup>6</sup> are independently alkylene groups having from 2 to 10 carbon atoms, and m is an integer having a value from 1 to 5.

4. A composition according to Claim 3, wherein R is independently selected from the group consisting of methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, a has a value of 0 or 1, and Y(i) is selected from the group consisting of ethylene, propylene, butylene, pentylene, trimethylene, 2-methyltrimethylene, pentamethylene, hexamethylene, 3-ethyl-hexamethylene, octamethylene, and decamethylene.

5. A composition according to Claim 3, wherein R is independently selected from the group consisting of methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, and a has a value of 0 or 1, R<sup>4</sup> is methyl, R<sup>5</sup> is propylene, R<sup>6</sup> is ethylene, and m has a value of 1.

6. A composition according to Claim 1, wherein (B) is selected from the group consisting of onium salts, diaryliodonium salts of sulfonic acids, triarylsulfonium salts of sulfonic acids, diaryliodonium salts of boronic acids, and triarylsulfonium salts of boronic acids.

SEARCHED  
INDEXED  
MAILED  
SERIALIZED  
FILED

7. A composition according to Claim 1, wherein (B) is selected from the group consisting of bis(dodecyl phenyl) iodonium hexafluoroarsenate, bis(dodecylphenyl) iodonium hexafluoroantimonate, dialkylphenyl iodonium hexafluoroantimonate, diaryliodonium salts of perfluorobutanesulfonic acid, diaryliodonium salts of perfluoroethanesulfonic acid, diaryliodonium salts of perfluoro-octanesulfonic acid, diaryliodonium salts of trifluoromethane sulfonic acid, diaryliodonium salts of para-toluene sulfonic acid, diaryliodonium salts of dodecylbenzene sulfonic acid, diaryliodonium salts of benzene sulfonic acid, diaryliodonium salts of 3-nitrobenzene sulfonic acid, triarylsulfonium salts of perfluorobutanesulfonic acid, triarylsulfonium salts of perfluoroethanesulfonic acid, triarylsulfonium salts of perfluoro-octanesulfonic acid, triarylsulfonium salts of trifluoromethane sulfonic acid, triarylsulfonium salts of para-toluene sulfonic acid, triarylsulfonium salts of dodecylbenzene sulfonic acid, triarylsulfonium salts of benzene sulfonic acid, triarylsulfonium salts of 3-nitrobenzene sulfonic acid, diaryliodonium salts of perhaloarylboronic acids, and triarylsulfonium salts of perhaloarylboronic acid.

8. A composition according to Claim 1, wherein (B) is selected from the group consisting of bis(dodecylphenyl) iodonium hexafluoroantimonate, diaryliodonium salts of trifluoromethane sulfonic acid, and triarylsulfonium salts of trifluoromethane sulfonic acid.

9. A composition according to Claim 3, wherein (B) is selected from the group consisting of bis(dodecylphenyl) iodonium hexafluoroantimonate, diaryliodonium salts of trifluoromethane sulfonic acid, and triarylsulfonium salts of trifluoromethane sulfonic acid.

10. A composition according to Claim 5, wherein (B) is selected from the group consisting of bis(dodecylphenyl) iodonium hexafluoroantimonate, diaryliodonium salts of trifluoromethane sulfonic acid, and triarylsulfonium salts of trifluoromethane sulfonic acid.

11. A composition according to Claim 1, wherein (C)(i) is selected from the group consisting of butanediol divinyl ether, hexanediol divinyl ether, and cyclohexane dimethanol divinyl ether.

12. A composition according to Claim 1, wherein (C)(ii) is selected from the group consisting of ethyl acrylate, propyl acrylate, butyl acrylate, tert.-butyl acrylate, tert.-amyl acrylate, hexyl acrylate, cyclohexyl acrylate, 2-ethylhexyl acrylate, isoctyl acrylate, isodecyl acrylate, dodecyl acrylate, lauryl acrylate, staryl acrylate, ethyleneglycol butyl acrylate, tetrahydrofurfuryl acrylate, isobornyl acrylate, tridecyl acrylate, caprolactone acrylate, 2-phenoxyethyl acrylate, and ethoxylated nonyl phenol acrylate, butanediol diacrylate, hexanediol diacrylate, cyclohexane dimethanol diacrylate, ethylene glycol diacrylate, diethylene glycol diacrylate, triethylene glycol diacrylate, neopentyl glycol diacrylate, ethoxylated<sub>2-20</sub> bisphenol A diacrylate, poly-THF diacrylate, and trimethylolpropane tri acrylate.

13. A composition according to Claim 9, wherein (C)(i) is selected from the group consisting of butanediol divinyl ether, hexanediol divinyl ether, and cyclohexane dimethanol divinyl ether.

14. A composition according to Claim 10, wherein (C)(i) is selected from the group consisting of butanediol divinyl ether, hexanediol divinyl ether, and cyclohexane dimethanol divinyl ether.

15. A composition according to Claim 9, wherein (C)(ii) is selected from the group consisting of ethyl acrylate, propyl acrylate, butyl acrylate, tert.-butyl acrylate, tert.-amyl acrylate, hexyl acrylate, cyclohexyl acrylate, 2-ethylhexyl acrylate, isoctyl acrylate, isodecyl acrylate, dodecyl acrylate, lauryl acrylate, stearyl acrylate, ethyleneglycol butyl acrylate, tetrahydrofurfuryl acrylate, isobornyl acrylate, tridecyl acrylate, caprolactone acrylate, 2-phenoxyethyl acrylate, and ethoxylated nonyl phenol acrylate, butanediol diacrylate, hexanediol diacrylate, cyclohexane dimethanol diacrylate, ethylene glycol diacrylate, diethylene glycol diacrylate, triethylene glycol diacrylate, neopentyl glycol diacrylate, ethoxylated<sub>2-20</sub> bisphenol A diacrylate, poly-THF diacrylate, and trimethylolpropane tri acrylate.

16. A composition according to Claim 10, wherein (C)(ii) is selected from the group consisting of ethyl acrylate, propyl acrylate, butyl acrylate, tert.-butyl acrylate, tert.-amyl acrylate, hexyl acrylate, cyclohexyl acrylate, 2-ethylhexyl acrylate, isoctyl acrylate, isodecyl acrylate, dodecyl acrylate, lauryl acrylate, stearyl acrylate, ethyleneglycol butyl acrylate, tetrahydrofurfuryl acrylate, isobornyl acrylate, tridecyl acrylate, caprolactone acrylate, 2-phenoxyethyl acrylate, and ethoxylated nonyl phenol acrylate, butanediol diacrylate, hexanediol diacrylate, cyclohexane dimethanol diacrylate, ethylene glycol diacrylate, diethylene glycol diacrylate, triethylene glycol diacrylate, neopentyl glycol diacrylate, ethoxylated<sub>2-20</sub> bisphenol A diacrylate, poly-THF diacrylate, and trimethylolpropane tri acrylate.

17. A composition according to Claim 1, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

18. A composition according to Claim 13, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

19. A composition according to Claim 14, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

20. A composition according to Claim 15, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

21. A composition according to Claim 16, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

22. A composition according to Claim 17, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, dodecylene epoxide, hexyl glycidyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

23. A composition according to Claim 18, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, dodecylene epoxide, hexyl glycidyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

24. A composition according to Claim 19, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, dodecylene epoxide, hexyl glycidyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

25. A composition according to Claim 20, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, dodecylene epoxide, hexyl glycidyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

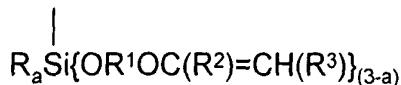
26. A composition according to Claim 21, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, dodecylene epoxide, hexyl glycidyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

卷之三

27. A method of making a radiation curable composition comprising:

(I) forming a mixture comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



wherein R is independently selected from the group consisting of monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from the group consisting of a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from

(i) a difunctional vinyl ether reactive diluent selected from the group consisting of butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2-20</sub> bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethoxyloxy butyl)-succinate, bis-(4-ethoxyloxy butyl)-adipate, bis-(4-ethoxyloxy butyl)-glutarate, bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) succinate, bis((4-((ethoxyloxy)methyl)cyclohexyl)methyl) adipate, and bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) glutarate or

(ii) an acrylate reactive diluent with the formula



wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at-least one acrylate functional group, and b has a value of 2 to 4.

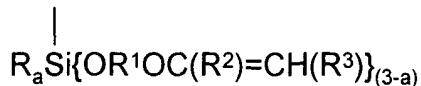
28. A method according to Claim 27, wherein the mixture further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

卷之三

29. A method of making an article of manufacture comprising:

(I) applying a radiation curable composition comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



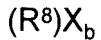
wherein R is independently selected from the group consisting of monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from the group consisting of a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from

(i) a difunctional vinyl ether reactive diluent selected from the group consisting of butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2-20</sub> bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethoxyloxy butyl)-succinate, bis-(4-ethoxyloxy butyl)-adipate, bis-(4-ethoxyloxy butyl)-glutarate, bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) succinate, bis((4-((ethoxyloxy)methyl)cyclohexyl)methyl) adipate, and bis-((4-((ethoxyloxy)methyl)cyclohexyl)methyl) glutarate or

(ii) an acrylate reactive diluent with the formula



wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at-least one acrylate functional group, and b has a value of 2 to 4 to a solid substrate to form a coating; and

(II) exposing the coating to an energy source selected from the group consisting of (i) ultraviolet light and (ii) visible light in an amount sufficient to cure the coating.

30. A method according to Claim 29, wherein the composition further comprises at least one ingredient selected from the group consisting of free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

RECEIVED  
U.S. PATENT AND  
TRADEMARK OFFICE

**ABSTRACT OF THE DISCLOSURE**

This invention relates to radiation curable compositions comprising an alkenyl ether functional polyisobutylene, a cationic photoinitiator, and a miscible reactive diluent selected from specified organic vinyl ether compounds or compounds having the formula 5  $R^8X_b$ , wherein  $R^8$  is a non-silicon containing organic group, X is an organic group containing at-least one acrylate functional group, and b has a value of 1-3. The radiation curable compositions exhibit a low cure energy, have a high moisture vapor barrier, high damping characteristics, and a high refractive index, and provide a barrier to corrosive vapors and have maintained or enhanced modulus, tensile strength, and toughness.